

Accelerating the Pace of Science Discovery Through Digital Transformation

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The future of the connected world is not just about the newest frontier technologies, such as high-band 5G. It will be defined by the expansion and evolution of existing advanced connectivity technologies – and the new architecture of connectivity will feature cloud and edge computing that is growing more powerful and more affordable. The connectivity ecosystem will be populated with more technologies, services, and providers than ever before.

Nowhere is this more visible than in the life sciences industry. The International Data Corporation (IDC) estimates that approx. 270 GB of healthcare and life science data will be created for every person in the world in 2020. However, the true potential value of these data goes largely untapped. A recent McKinsey report states that, “Technology has not delivered the kind of progress that many expected and compared to other domains healthcare has lagged in digitizing.”

Unlocking new value from data

Without universal data connectivity, the life sciences industry will never be ready to embrace digital transformation. Legacy systems, vendor-specific instruments that cannot be inter-connected, and an unwillingness to embark on introducing new processes into the highly regulated life sciences and pharma sectors have created a huge challenge for technology harmonization.

According to Forbes, “Between 60% and 73% of all data within an enterprise go unused for analytics,” – meaning that, essentially, the majority of data generated are just wasting away in a digital drawer.

Data complexity and volume have had a significant impact on lab integration. A typical lab now has multiple software and hardware platforms, as well as laboratory information management systems (LIMS) to handle the reams of data it generates. It is the end-users who are, effectively, creating the integration problem in the first place by pushing the boundaries of scientific research.

Overcoming the challenge of corraling data produced by different systems, particularly in an industry that still relies on USBs and manual keystrokes, and organizing those data into a usable format is stifling scientific progress. Because the data comes from a huge variety of sources, the time spent curating data, hunting down the correct data – particularly those from unconnected instruments – and solving data issues takes more time than actually using the data for science.

Productivity gains through interconnected systems

New cloud-based solutions will play a key role in building the lab of the future, where digital data can move freely between different resources, applications, and instruments. Scientists using lab technologies want to be able to work as effectively as possible, and that involves interconnecting their systems and instrumentation seamlessly.

For the lab, data that is available at the right time, in the right place, and, critically, in the right format is a transformational change. Establishing lab workflows quickly, out of the box, and setting the business rules that determine how data flows back and forth make it easier, ultimately, to find answers to scientific questions.

Harmonizing the data platform brings together all the different data in a more meaningful way, with the objective of finding more insights from the data, to enable analysis and decision making and to open up collaboration possibilities.

Balancing innovation with integrity

A key factor in being able to achieve meaningful insights is the ability to aggregate and standardize data. Driving a streamlined capability allows the lab to leverage technology to its best advantage, enabling scientific endeavors to move at speed. At the same time, in this highly regulated sector, digital data integrity is critically important. As automation becomes more commonplace, setting up an event stream will help track the integrity of the data throughout its journey, which is vital to demonstrate compliance.

Artificial intelligence (AI) and machine learning (ML) are voracious consumers of data – and huge amounts of data stored in laboratory data lakes are needed to educate the system and for algorithms to operate properly. Connecting and harmonizing data provides the vehicle necessary to feed data lakes.

Curating data in flight is another significant step forward. Setting up business rules, such as specifying the presence of certain metadata, allows notifications to be set up on the fly and data segmented into space for curation, or remedy, while in flight. This will help identify issues faster and speed up decision-making.

The need for this is clear – and has been particularly highlighted by the Covid-19 pandemic. The speed at which the scientific community has worked to understand the virus and develop a vaccine is largely thanks to the ability to integrate systems, contextualize and harmonize data and results, and share data collaboratively. None of this would be possible without a connected and holistic solution across the entire lab space.

What does the future look like?

Removing the barrier around digital data exchange in the lab is the only way to achieve digital transformation. This issue is not a new one. Since the introduction of some of the early lab informatics systems in the 1980s, which removed sole reliance on manual data entry, the data exchange interface was born. Legacy systems, however, and unconnected instruments continue to stifle progress in the lab of today.

The next step is to develop a holistic connectivity solution that allows data to move freely. Decoupling the integration platform from the different software applications, informatics, and systems in the lab, so they can all interoperably exchange data, will be critical for the digital transformation of the laboratory.

Despite leaps forward in lab automation and the huge benefits it delivers to data modeling and analysis, it is also critically important to keep the human interface. Experience, judgment, and even intuition will always need to come into play – and technology will be a key enabler.

As the benefits of digital transformation are increasingly realized, the industry is welcoming the move to a more modern ecosystem, that allows interoperability between any instrument, including legacy instruments, software, application, and resource in terms of data exchange.

All organizations in the scientific and lab space must adapt to the pace of technological change, keep up with the increased scale of data generation and embrace the huge potential that will change the way the lab functions, across the globe. In an environment where many processes and business models are unprepared to meet the challenges of the future, it is those who will adapt and look to new models who will thrive.